Columbia River Channel Improvement Project

Webb Wildlife Mitigation Site
Columbia County, OR

Webb Wildlife Mitigation Site Ground Water Elevation Monitoring Report

U.S. Army Corps of Engineers
May 5, 2005

Purpose and Need

The purpose of this investigation is to monitor ground water levels and water surface levels of the interior slough adjacent to the Webb wildlife mitigation area (Enclosure A) prior to, during and after construction. To achieve the stated purpose, water level measuring instruments (piezometers) have been installed at four locations external to where the levee for the mitigation site will be constructed. Soil characteristics and elevation information for each piezometer location are provided in Enclosure B. In addition, a stream gauge was placed in the interior slough adjacent to the mitigation site. The interior slough surrounds the mitigation site to the north, west and east. Pre-construction baseline data is being collected for comparison to post-construction data to determine if changes occur in ground water and/or interior slough water surface levels.

The need for monitoring ground water levels and interior slough water surface elevations is predicated upon the concerns of adjacent landowners that the proposed action may affect ground water levels on their property or result in greater cost associated with their pumping efforts to discharge water from the interior slough to Westport Slough.

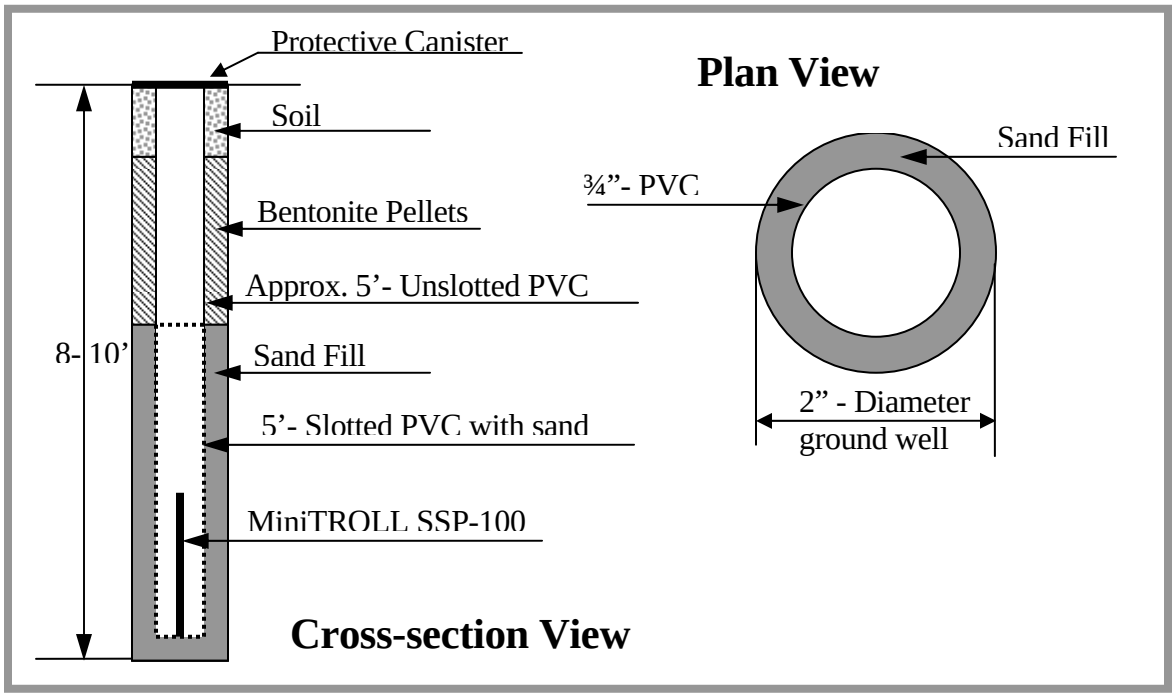
Instrument Installation

Piezometers measure pressure generated by the depth of water over the instrument. These pressure readings can subsequently be equated to ground water levels as measured in elevation per a specific datum. Elevation for each of the Webb piezometers is based on National Geodetic Vertical Datum 29 (NGVD29). A barometer was also installed with one of the piezometers and a stream gauge was placed in the interior slough east of the wetland management area to monitor the water level of the interior slough. For exact locations of instruments, please see Enclosure A.

Four piezometers were installed outside of the proposed dike alignment for the wildlife mitigation site to monitor ground water levels. Cross-sectional and plan views of piezometer installation are provided in Figure 1. A two-inch diameter hole eight to ten feet deep was bored with a hand auger at each of the four piezometer locations. A ¾ - inch diameter, ten-foot long PVC pipe was placed in each hole. The lower five feet of the PVC pipe was factory slotted with a factory manufactured sand filter installed around the pipe. The upper five feet of the PVC pipe was unslotted. The PVC pipe was cut off flush with the ground level. To fill the remaining open space between the pipe and the sides of the hole to near the ground surface; five feet of sand fill was placed around the lower 5-feet of PVC pipe, then bentonite pellets and soil were used to fill the balance of the open space (Figure 1). A miniTROLL Model SSP-100 combination piezometer and associated data logger were placed at the bottom of each of the four PVC pipes. The data logger was programmed to record ground water level data at fifteen-minute intervals. The data logger stores the data until collected by Portland District Personnel. A protective canister was placed flush with the ground surface over each installation site to provide protection from cattle and/or equipment. A barometer was placed in the Webb2 PVC pipe to account for atmospheric

pressure. A stream gauge was installed in the interior slough east of the wetland management area to track interior slough water levels. The stream gauge was placed as close to the middle of the interior slough as possible.

Figure 1. Cross-sectional and plan views of installation of instrument package



The ground surface elevation at each piezometer location varied from 1.6 feet to 4.4 feet. Soil encountered at each site was similar, and generally consisted of a few feet of clay material, which graded to silt then to silty sand. A gray medium grain sand or silty sand was normally encountered at about elevation minus 5 feet.

Recordings (boring logs) from each piezometer are attached (Enclosure B). The location and elevation of each boring was determined using Real Time Kinematic Global Positioning System (GPS). Location accuracies are expected to be +/- 0.3 feet north and east and +/- 0.1 feet for elevation.

Piezometer Results for August 13, 2004 through December 2004

Data from each piezometer has been collected through April 5, 2005. The instruments were placed on July 21, 2004, and monitored since August 13, 2004, after an initial period of calibration. Trends are generally comparable for each instrument location although ground water elevations are different by piezometer location. The ground water level monitored at each piezometer site fluctuates with the water surface level of the interior slough. The elevation difference between the interior slough and each piezometer is generally constant during August and increases significantly after rains begin in September and October with the widest spread in December 2004 and late March – early April 2005. Thus, with the

onset of fall 2004 and subsequent winter rains, the ground water elevation is substantially higher than the water surface elevation of the interior slough, forming a more pronounced vertical gradient from the piezometer locations to the interior slough.

Webb 1 is located outside the proposed wetland management levee on the northeastern side of the mitigation area, approximately 130 feet southwest of the interior slough (Enclosure A). The water level in Webb 1 is generally about 0.5 feet above the interior slough during August and increased to approximately 1 to 1.5 feet higher in December (Enclosure C).

The second instrument, Webb 2, is located approximately 100 feet west of the western portion of the proposed wetland management levee and approximately 150 feet southeast of the interior slough (Enclosure A). The difference between the interior slough water surface elevation and the water level measured by Webb 2 is generally about 0.4 feet during August and increases to about 1.2 feet in late October (Enclosure C). Again, ground water elevation at the piezometer location is greater than the water surface elevation of the interior slough for the entire period of record.

Webb 3 is located northeast of the wetland management area with the interior slough lying between the instrument and the proposed levee alignment (Enclosure A). Data from this instrument show that during the August through October period ground water levels were below the interior slough level and were apparently being influenced by the water level in Westport Slough. By November, rainfall had caused the ground water level to rise to an elevation above the interior slough but the pattern of fluctuations suggests that Westport Slough is still the principal influencing factor in the area being monitored by Webb 3 (Enclosure C).

Webb 4 is located north of the wetland management area and is approximately 75 feet north of the interior slough (Enclosure A). Thus the interior slough lies between the instrument and the proposed levee alignment. The data plot for this instrument are very similar to Webb 1 and Webb 2, generally following the fluctuations in interior slough water surface elevation, with the elevation difference increasing after rains began in September and October (Enclosure C). Again, ground water elevation at the piezometer location is greater than the water surface elevation of the interior slough for both the dry and wet periods.

The interior slough stream gauge is located at Webb 5 (Enclosure A). Water surface elevation is recorded for comparison ground water levels as measured by the piezometers (Enclosure C).

Conclusions

The data collected thus far from the piezometers indicates that the general ground water level in the wildlife mitigation area is controlled by and follows the water surface level of the interior drainage slough. Once the fall and winter rains begin the difference between interior slough water surface levels and the ground water level at the piezometer locations begins to increase. Ground water levels for Webb 1, 2 and 4 exceeded the water surface

level of the interior slough (Webb 5) during the dry and wet seasons for data collected to date (Enclosure C). Piezometers outside of the interior drainage slough have the potential to be influenced by drainage ditches such as those that bound Webb 4 or by Westport Slough as in the case of Webb 3 (Enclosure C).

Enclosures

Enclosure A - Site Map with Piezometer Locations
Enclosure B – Boring Log with soil and elevation information
Enclosure C – Ground water elevations by piezometer location plus interior slough water surface elevation levels